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SECRET

DISTILLING SYSTEM

Description and Maintenance Instructions

И641-А76-206

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I. DESCRIPTION

A. PURPOSE AND BASIC SPECIFICATIONS

The system is intended to receive, store and feed the distillate to the battery wells for battery make-up. As distilled water is consumed, replenishing the stowage tanks is accomplished by the use of the electric distilling plant.

The distilled water stowage tanks are of the following stowage capacities:

tank No.1 - 2730 lit;
tank No.2 - 2060 lit.

The total distilled water stowage capacity of the submarine is 4790 lit.

The basic characteristics of the distilling system pipe lines are tabulated below.

Table 1

No.	Pipe line	External dia. and thickness of pipe wall	Material		Remarks
			pipes	fittings	
1	Distilled water	32 x 2 25 x 1.5 14 x 1.5	stainless steel	stainless steel, brass	
2	Air pipe line	14 x 1.5 6 x 1.5	stainless steel	stainless steel, brass	

Test pressures of the pipe lines are given in Table 2.

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Table 2

No.	Pipe line	Pressure test for tightness kgf/sq.cm	Remarks
1	Distilled water pipe line		
	(a) from valves 13, 15 to the valve on the distilling plant pipe line	12.5	Tested under hydraulic pressure
	(b) from valves 15, 22, 24 to the distilled water stowage tanks	0.8	Tested under air pressure together with tanks
2	Air pipe line		
	(a) from the air pipe line of No.1 fresh water tank to valves 1, 6 to the plug-nut of No. 3 distilled water stowage tank and to the distilled water stowage tanks	0.8	Tested under air pressure together with tanks
	(b) from valves 1, 6 to the bilge	In operation	

B. GENERAL DESCRIPTION AND DESCRIPTION OF INDIVIDUAL UNITS

The distilling system (see the accompanying drawing) includes two tanks and pipe lines with fittings.

The distilled water pipe line consists of the main with the branch pipes running as follows:

in No.I compartment - to the distilled water stowage tanks, to the battery well cooling pipe line, to valve 22 and to sampling valve 24;

in Nos II and IV compartments - to the battery wells.

In No.VI compartment the distilled water main is connected with the pipe line of the electric distilling plant.

The distillate is stowed in special distilled water stowage tanks Nos 1 and 2 located in No.I compartment.

The distillate is fed to the tanks either by gravity through funnel 18 or under pressure through hose 16.

Funnel 18 or hose 16 are screwed on the upper part of sleeve 19, feed hose 20 being screwed on the lower portion of the sleeve. The feed hose is led to the compartment through the torpedo embarkation hatch to valve 22.

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The tanks when being filled are vented through the vent pipes with vent valves 1 and 6.

Make-up water is fed to the battery wells from the tanks through valves 13 with the help of detachable hoses 14. One detachable hose 14 is provided per battery well.

From the tanks water is expelled with compressed air supplied from the air pipe line of No.1 fresh water tank through valves 7 and 25.

The air is fed to the tanks under a pressure of approximately 0.8 kgf/sq.cm.

To check the pressure in the tanks which should not exceed 0.9 kgf/sq.cm, the ends of the pipes feeding the air to the tanks mount pressure gauges 4, 9 and safety valves 2, 8 set for a pressure of 0.9 kgf/sq.cm.

The air supply pipe line is equipped with a branch pipe with valve 26 to feed the air to No.3 distilled water tank of the battery well cooling system.

Arranged on the water pipe line of the distilling system is a branch pipe running to the battery well cooling pipe line. This branch pipe is used to feed the distillate to the battery well cooling system in the course of loading.

Prior to feeding the distillate for filling the tanks and for make-up of the battery, the distillate shall be sampled and tested in accordance with the Submarine Storage Batteries Upkeep Instructions.

A sample of water is taken through sampling valve 24.

If water does not correspond to the requirements specified in the Submarine Storage Batteries Upkeep Instructions, the tanks shall be drained to the fresh drinking or washing water tanks or to the sanitary tanks. This water may be used for washing purposes.

The remaining make-up water is transferred to the fresh water tank if the distilled water stowage tanks are compensated with sea water.

The distilled water is supplied to the fresh water tanks through feed hose 20 connected to valve 22 and to the respective valve seated on the drinking, washing and sanitary water pipe lines.

The distilled water stowage tanks may be replenished from the electric distilling plant in accordance with the instructions for maintenance of the distilling plant pipe lines.

After the stock of water has been consumed from the tanks, air from them is bled to the compartment through the vent pipes with vent valves 1 and 6, and the tanks may be flooded with sea water, if necessary, which is accomplished from the end valve on the drain main through the hose along the compensating pipes with nuts 3 and 10 (see the instructions for maintenance of the trim and drain systems).

The tanks may be flooded when the submarine is on the surface or when she is snorting, for which purpose proceed in strict adherence to the instructions for consumption of and compensation for variable weights.

Sea water is drained from the tanks with the aid of the bilge pump which removes water through the end valve on the starboard drain main and through the hose connected to the compensating pipes with nuts 3 and 10 of the starboard drain main.

C. CONTROL INSTRUMENTS

Table 3

No. acc. to schematic diagram	Description	Type of instrument and scale	Rated limit value	Installed
4, 9	Pressure gauge to measure pressure of air in Nos 1 and 2 distilled water stowage tanks	[illegible] 0–1.6 kgf/sq.cm. division value 0.05 kgf/sq.cm.	[illegible] kgf/sq.cm.	On pipes feeding air to Nos 1 and 2 distilled water stowage tanks

II. MAINTENANCE INSTRUCTIONS

A. GENERAL SUPERVISION AND UPKEEP

1. In the course of operation of the distilling system, keep the fittings and the pipe lines in good order, take care that they are properly secured to the hull structural members.

2. When operating the distilling system:

(a) keep the pipe lines and the fittings in constant readiness for immediate action;

(b) ensure that the pipe lines, joints and fittings are perfectly tight; immediately eliminate leaks in union connections and in gland packings;

(c) see to it that all the valves and the hoses are always easy to get at;

(d) smoothly open the valves on the pipe lines under pressure;

(e) tighten up and repack the glands if necessary.

3. Care should be exercised to see that the pressure gauges and the safety valves are in good order and sealed; if the pressure gauges produce wrong readings, their sealing is disturbed or the term of their check is up, they shall be sent for checking or replaced.

4. With the distilling plant in operation, pay attention to condition of the fittings and the pressure gauges, see to it that the pipes are free from cracks and their joints are perfectly tight.

5. In case of disassembly and reassembly of the pipes care should be taken that no foreign matter is allowed to get into them, for which purpose blank off the ends of the disconnected pipes with wooden or metal plugs.

Never blank off the pipes with rags since they are likely to get into the pipes.

6. In disassembly and reassembly of the pipes use the specified tools not to damage the pipes.

7. Separate sections of the pipes which were disassembled should be tested for tightness in accordance with Table 2.

B. PREPARATORY STEPS

Initial Position

Distilled water stowage tanks are filled with distillate.

[illegible] valves and the cocks are shut.

10. All the hoses are disconnected from the valves and are stowed in their proper places.

11. Plug-nuts are placed on valves 13, 22,24, on sleeve 19 and on the compensating pipes.

Preparation for action

12. Bring the system to the initial position.

C. STARTING, DURING-OPERATION MAINTENANCE AND STOPPING

The procedures outlined under the previous Section are supposed to have been performed.

The valves and cocks to be opened (shut) for the procedures of this Section shall be shut (opened) after fulfilment of a procedure.

Feeding the distilled water

Prior to feeding the distilled water, do the following:

13. Remove plug-nuts 17 from sleeve 19 and screw feed hose 18 or feed hose 16 on the upper pipe union of the sleeve.

14. Remove plug-nut 21 from valve 22.

15. Connect hose 20 to the lower pipe union of sleeve 19 and valve 22.

16. Remove plug-nut 23 from valve 24.

17. Open vent valves 1 and 6.

18. Open valve 22.

19. Open valve 24 and drain 6-8 litres of water to a pot [illegible].

20. Shut valve 24.

21. Open valves 5 and 11.

22. After water starts escaping from the vent valve [illegible] and respective feed valves 5 and 11, next shut vent valves 1 and 6.

Feeding make-up water to batteries

Depending on the battery well for which make-up water is to be [illegible] proceed as follows:

23. Remove plug-nut 12 from respective valve 13 and connect it with respective hose 14 with a make-up cock.

24. Open valve 5 or 11 depending on the tank from which water is to be transferred.

25. Open valve 15.

26. Open the respective valves on the pipe line feeding air to Nos fresh water tank, proceeding in accordance with the "Drinking, Washing and Sanitary Systems. Description and Maintenance Instructions" and feed air to [illegible] line of the distilling system.

27. Open valve 7 or 25 and observing pressure gauge 9 or 4 create in respective tank a pressure not exceeding 0.8 kgf/sq.cm, after which shut valve 7 or 25.

28. Open respective valve 13.

29. By cracking the cock on hose 14, feed make-up water to the battery.

Note: In case pressure in the air cushion drops when consuming water from the tanks, repeat the procedure outlined under Item 27.

Replenishing the distilled water stowage tanks from the electric distilling plant

30. Perform the respective procedures in accordance with the instructions for maintenance of the electric distilling plant pipe lines.

31. Remove plug-nut 23 from valve 24.

32. Open vent valve 1 or 6 depending on the tank to be replenished.

33. Open valve 15.

34. Open valve 24 and drain approximately 12-15 litres of water to a portable vessel.

35. Shut valve 24.

36. Open valve 5 or 11 depending on the tank to be replenished.

37. After water starts escaping from the tank vent valves, shut valve 5 or 11, after which shut vent valve 1 or 6.

Feeding distillate to the fresh water tanks

Prior to feeding the distillate to the fresh water tanks, proceed as follows:

38. Remove plug-nut 21 from valve 22.

39. Connect hose 20 to valve 22 and to the respective valve on the drinking, washing and sanitary water pipe lines.

40. Open valve 22.

41. Perform the procedures outlined under Items 24, 26 and 27.

42. Perform the respective procedures in accordance with the Instructions for maintenance of drinking, washing and sanitary water system.

43. After draining the tanks, bleed the air by opening respective vent valve 1 or 6.

Flooding the tanks with sea water and draining them

To [illegible] stowage tanks with sea water, do the following:

44. Open respective vent valve 1 or 6 depending on the tank to be replenished and bleed the air from the respective tank.

45. Remove respective plug-nut on the respective compensating pipe and connect the hose to it running from the end valve on the drain main.

46. Flood the respective tank with sea water performing the procedures in accordance with the Instructions for maintenance of the drain and trim system.

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47. As soon as water shows from the tank vent pipe, cut off water supply as prescribed by the Instructions for maintenance of the drain and trim systems.

48. Shut respective vent valve 1 or 6.

To drain sea water from the distilled water stowage tanks, it is necessary to do the following.

49. Open respective vent valve 1 or 6 depending on the tank to be drained.

50. Remove respective plug 3 or 10 on the respective compensating pipe and connect the hose to it from the end valve on the drain main.

51. Prepare the drain system proceeding in accordance with the Instructions for maintenance of the drain and trim systems and drain the tanks in turn.

52. After sea water has been drained from the tanks, fill them with fresh water for three times and every time [illegible] fresh water for an hour, after which remove manholes, [illegible] tanks with distilled water and take a sample of the distilled [illegible] for impurities (See the "Submarine Storage Batteries [illegible]").

D. MAINTENANCE DURING PROTRACTED [illegible]

53. In case of protracted [illegible] the following:

(a) blow the pipe lines [illegible]

(b) check the amount of water [illegible] the joints in the lower [illegible] water, then tighten [illegible]

54. To put the [illegible] period, the following [illegible]

[illegible] of all the [illegible]

[illegible]

E. TROUBLES [illegible]

In case the pipe lines are to be disassembled [illegible] make sure that the pipe lines are not under pressure [illegible] valve to remove pressure and drain water from the respective [illegible] the pipe line.

The table below gives possible troubles and their remedies.

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Table 4

No.	Symptom or difficulty	Condition may be due to	Correction
1	Gland packings of valves and cocks leaky	Nuts pressing gland packings loose, gland packings worn	Tighten up nuts of glands, replace gland packing
2	Valves untight	Uneven wear of or damage to fitting surfaces of discs or saddles	Lap valve discs
3	Union joints untight	Nuts loose, gaskets worn	Tighten up nuts, replace gaskets

Note: Where disassembly of pipes has been called for trouble correction, test the pipes for tightness in accordance with the directions given in Table 2.

F. PREVENTIVE MAINTENANCE AND REPAIRS

These are carried out as follows:

Daily Inspection

55. Make sure that seals are present on the safety valves and pressure gauges.

Weekly Inspection

[illegible] the procedures of daily inspection and besides do the follow- [illegible]

[illegible]

[illegible] Perform [illegible] ing:

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60. Clean the distilled water stowage tanks to remove sediment from them.

Inspection during Running Repair

Perform the procedures of three months inspection and [illegible] do the following:

61. Disassemble, inspect and adjust [illegible] valves.

62. If necessary, disassemble, inspect and repair [illegible] valves, replace worn packings and gaskets.

63. Check the painted surfaces of the tanks [illegible] make touch-up, if necessary.

64. Check [illegible] assembled water and air [illegible] water stowage tanks for tightness [illegible]

65. Once a year send the [illegible]

66. [illegible] a year and after [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]. Remove plug-nut 12 [illegible]

[illegible]

[illegible] valve [illegible]

[illegible] distilling plant [illegible]

[illegible]. In this case the pipe line shall [illegible] filling the pipe line, shut valve [illegible].

70. Use a pump to build up a pressure [illegible] and check the pipe joints and the fittings [illegible]

71. After testing the pipe line, remove [illegible] the pump is connected, disconnect the pump [illegible] the pipe line and connect plug-nut 12 to valve [illegible].

G. REFERENCE DATA

The rubber hoses used in the distilling system are [illegible] partments of the submarine as indicated in the Table below.

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Table 5

No.	Place acc. to schematic diagram	Dia. and length	Qnty	Used	Compartment
1	14	dia.12, l =10 m	4	For battery make-up	II and IV
2	16	dia.25, l =20 m	1	To receive distilled water	I
3	1	dia.25, l = 2 m	1	To feed distilled water	I

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APPENDIX

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NOTE: The numerators of the fractions standing at the pipes show the sizes of the pipes, while the denominators indicate the hydraulic and air test pressures in kgf/cm² when testing the pipes for tightness.

[illegible] water storage tank (for storing the storage battery)

Pressure source	
Plug-out	
Safety valve	
Shut-off straightway valve	
Funnel	

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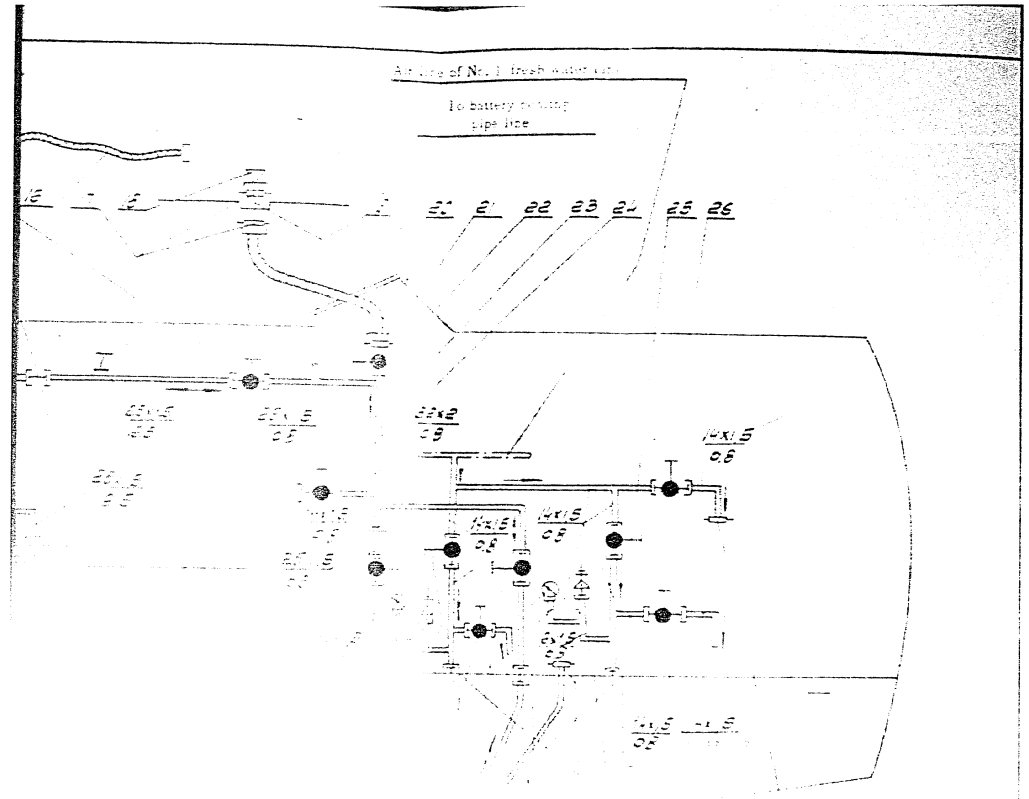

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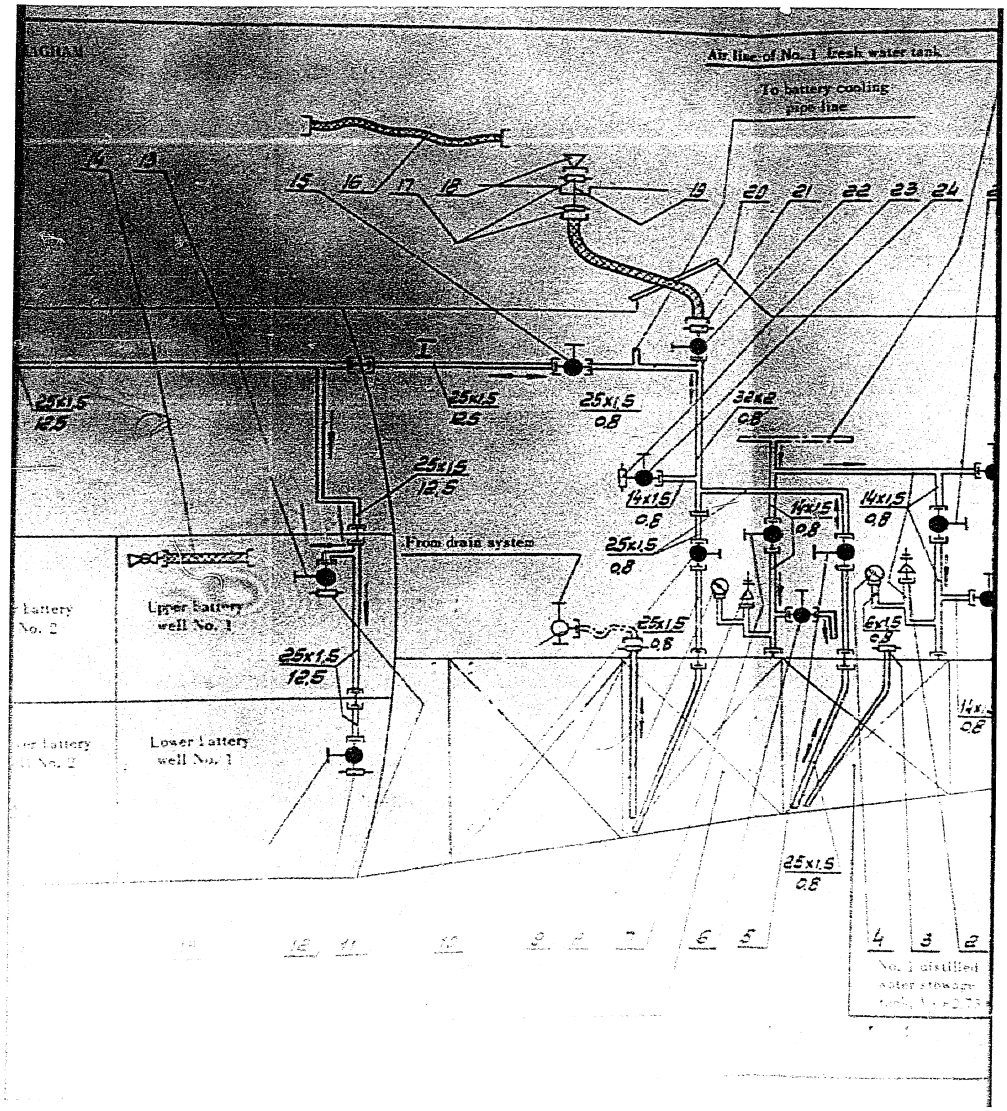

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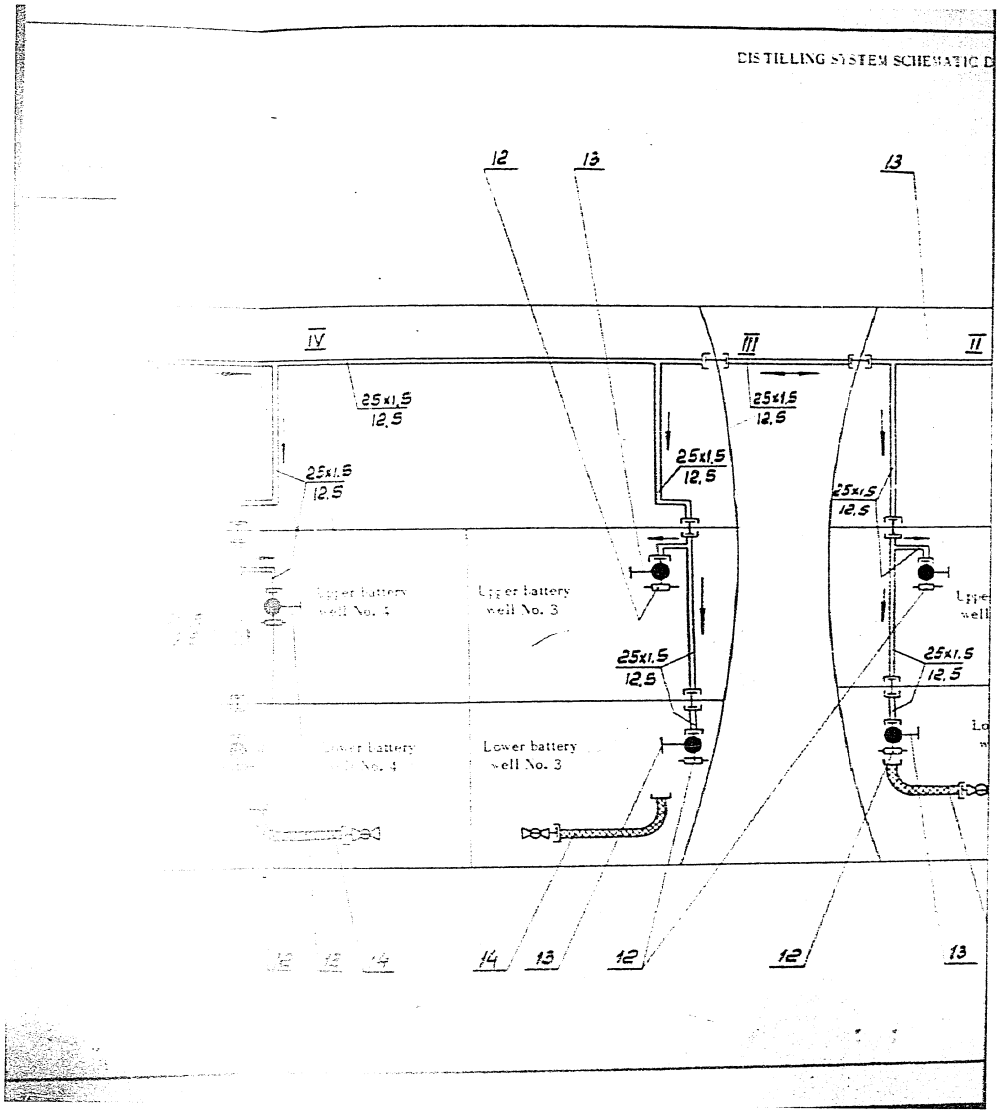

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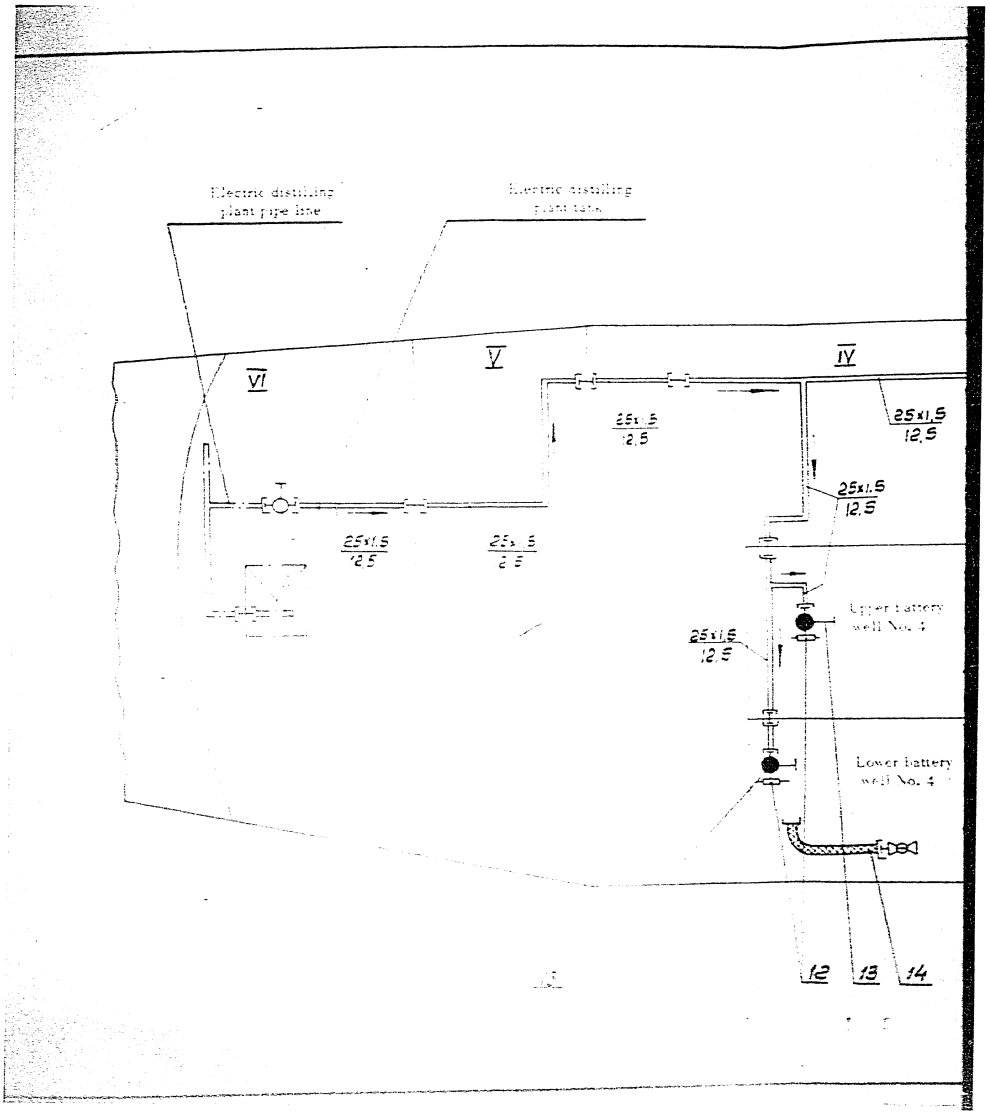

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